

What is claimed is:

1. A dual-band FR4 chip antenna, wherein said dual-band FR4 chip antenna has a first operating band and a second operating band, and said dual-band FR4 chip antenna comprises:

an FR4 chip base, wherein said FR4 chip base is made of an FR4 material;  
a meandering radiating metal line; and  
a connecting point, which is used for connecting said meandering radiating metal line to a signal transmission line.

2. The dual-band FR4 chip antenna of claim 1, wherein the total length of said meandering radiating metal line is about  $1/4 \lambda$  (wavelength) of the central frequency in said first operating band.

3. The dual-band FR4 chip antenna of claim 1, wherein the central frequency of said first operating band and the central frequency of said second operating band are the first two resonant frequencies of said meandering radiating metal line.

4. The dual-band FR4 chip antenna of claim 1, wherein the shape of said FR4 chip base is selected from a group consisting of a rectangular prism, a square prism and a cylinder.

5. The dual-band FR4 chip antenna of claim 1, wherein the dielectric constant of said FR4 chip base is between about 4 and about 5.

6. The dual-band FR4 chip antenna of claim 1, wherein said meandering radiating metal line is formed on at least two surfaces of said FR4 chip base.

5 7. The dual-band FR4 chip antenna of claim 1, wherein said meandering radiating metal line further comprises:

a lower metal line, wherein said lower metal line is located on a lower surface of said FR4 chip base;

an upper metal line, wherein said upper metal line is located on an upper surface of said FR4 chip base; and

10 a connecting metal line, wherein said connecting metal line is located on one side of said FR4 chip base.

8. The dual-band FR4 chip antenna of claim 7, wherein said lower metal line comprises:

15 a first lower horizontal line, wherein one end of said first lower horizontal line is vertically connected to said transmission line;

a first lower vertical line, wherein one end of said first lower vertical line is connected to the other end of said first lower horizontal line, and

20 a second lower horizontal line, wherein one end of said second lower horizontal line is connected to the other end of said first lower vertical line, and the other end of said second lower horizontal line is connected to one end of said connecting metal line.

9. The dual-band FR4 chip antenna of claim 7, wherein said upper metal line comprises:

25 a first upper horizontal line, wherein one end of said first upper horizontal line is

connected to the other end of said connecting metal line;

a first upper vertical line; wherein one end of said first upper vertical line is connected to the other end of said first upper horizontal line;

5 a second upper horizontal line, wherein one end of said second upper horizontal line is connected to the other end of said first upper vertical line;

a second upper vertical line, wherein one end of said second upper vertical line is connected to the other end of said second upper horizontal line, and said second upper vertical line is extended to about the middle of one side of the upper surface of said FR4 chip base; and

10 a third upper horizontal line, wherein one end of said third upper horizontal line is connected to the other end of said second upper vertical line, and the length of said third upper horizontal line is shorter than said first upper horizontal line and said second upper horizontal line.

15 10. The dual-band FR4 chip antenna of claim 7, wherein said meandering radiating metal line has a plurality of widths.

11. The dual-band FR4 chip antenna of claim 7, wherein the width of said meandering radiating metal line is a fixed value.

20 12. The dual-band FR4 chip antenna of claim 7, wherein said meandering radiating metal line is formed inside said FR4 chip base.

25 13. The dual-band FR4 chip antenna of claim 7, wherein said dual-band FR4 chip antenna is mounted on a microwave substrate having a ground surface, and one

portion of an area where said microwave substrate contacts said dual-band FR4 chip antenna is not covered with said ground surface, and said signal transmission line is located on said microwave substrate.

5           14. A dual-band FR4 chip antenna, wherein said dual-band FR4 chip antenna has a first operating band and a second operating band, and said dual-band FR4 chip antenna comprises:

an FR4 chip base, wherein said FR4 chip base is made of an FR4 material, and the dielectric constant of said FR4 chip base is between about 4 and about 5;

10           a meandering radiating metal line, wherein said meandering radiating metal line is formed on at least two surfaces of said FR4 chip base, and the total length of said meandering radiating metal line is about  $1/4 \lambda$  (wavelength) of the central frequency in said first operating band; and

15           a connecting point, which is used for connecting said meandering radiating metal line to a signal transmission line.

20           15. The dual-band FR4 chip antenna of claim 14, wherein the central frequency of said first operating band and the central frequency of said second operating band are the first two resonant frequencies of said meandering radiating metal line.

25           16. The dual-band FR4 chip antenna of claim 14, wherein the shape of said FR4 chip base is selected from a group consisting of a rectangular prism, a square prism and a cylinder.

17. The dual-band FR4 chip antenna of claim 14, wherein said meandering

radiating metal line further comprises:

a lower metal line, wherein said lower metal line is located on a lower surface of said FR4 chip base, and said lower metal line comprises:

5 a first lower horizontal line, wherein one end of said first lower horizontal line is vertically connected to said transmission line;

a first lower vertical line, wherein one end of said first lower vertical line is connected to the other end of said first lower horizontal line, and

a second lower horizontal line, wherein one end of said second lower horizontal line is connected to the other end of said first lower vertical line;

10 an upper metal line, wherein said upper metal line is located on an upper surface of said FR4 chip base, and said upper metal line comprises:

a first upper horizontal line;

a first upper vertical line; wherein one end of said first upper vertical line is connected to one end of said first upper horizontal line;

15 a second upper horizontal line, wherein one end of said second upper horizontal line is connected to the other end of said first upper vertical line;

a second upper vertical line, wherein one end of said second upper vertical line is connected to the other end of said second upper horizontal line, and said second upper vertical line is extended to about the middle of one side of the upper surface of said FR4 chip base; and

20 a third upper horizontal line, wherein one end of said third upper horizontal line is connected to the other end of said second upper vertical line, and said third upper horizontal line is shorter than said first upper horizontal line and said second upper horizontal line; and

25 a connecting metal line, wherein said connecting metal line is located on one

side of said FR4 chip base, and one end of said connecting metal line is connected to the other end of said second lower horizontal line, and the other end of said connecting metal line is connected to the other end of said first upper horizontal line.

5        18. The dual-band FR4 chip antenna of claim 14, wherein said meandering radiating metal line has a plurality of widths.

10        19. The dual-band FR4 chip antenna of claim 14, wherein the width of said meandering radiating metal line is a fixed value.

15        20. The dual-band FR4 chip antenna of claim 14, wherein said dual-band FR4 chip antenna is mounted on a microwave substrate having a ground surface, and one portion of an area where said microwave substrate contacts said dual-band FR4 chip antenna is not covered with said ground surface, and said signal transmission line is located on said microwave substrate.